

Utility Interconnection Equipment Certification

The information on this form is provided to indicate the compliance of the generation equipment listed below with the utility interconnection certification requirements defined in this Rule.

Certifying Laboratory *The information on this form is provided by the following Nationally Recognized Test Laboratory:*

Laboratory: ITS – ETL Semko

Contact Name: Michael Murphy Phone: 978-635-8538 E-mail: mmurphy@etlsemko.com

Address: 70 Codman Hill Road

City: Boxborough State: MA Zip: 02451

Accredited by: OSHA-NRTL Date: _____

Accredited to (test standards)ⁱ: Federal Register 29 CFR 1910.7 ref: ISO Guide 25 and 28, UL1741

Equipment Specification *The information on this form applies to the following equipment:*

Equipment Manufacturer: Tecogen, Inc.

Address: 45 First Avenue

City: Waltham State: MA Zip: 02451

Model Number(s): CM-60, CM-75 (High Voltage 460V and Low Voltage (208/230V)

Software Version(s): 6/14/02 or later

Effectiveⁱⁱ: Serial Number 200648 or Later . Serial Numbers below this may be upgraded in the field to comply if required.

Device Descriptionⁱⁱⁱ: The TECOGEN[®] is a packaged, indoor, cogeneration module that produces both electricity and hot water. It's output rating is either 75kW or 60 kW, 3 phase, 208/230/460V. It uses a natural gas-fired internal combustion engine to drive an induction generator. The heat from the high temperature (up to 230 °F) hot water produced by the engine is recovered for building heat loads. With both the electrical and thermal energy produced by the unit, the efficiency is 91% (based on the Lower Heating Value of Natural Gas).

Since the cogeneration unit is equipped with an induction generator, it runs in parallel with the utility and requires power from the utility to operate.

The TECOGEN can meet all California air quality standards when equipped with the emission control option. A microprocessor-based, closed-loop, feedback control system maintains tight control over the air/fuel ratio. The rich-burn engine's exhaust is treated with a three-way or NSCR (Non-Selective Catalyst Reduction) catalyst, designed to simultaneously reduce NO_x, CO, and HC levels

Date: 3/19/03

The Rule 21 Certification Verification Subcommittee has reviewed the anti-islanding test results provided by Underwriter Laboratories for Tecogen Models CM75H, CM60H, CM75L and CM60L and has compared those results (UL File # E234051, dated 02/14/2003) to the requirements stated in the current published versions of Rule 21. Based on this review, the committee has verified compliance of the above named models with the Rule 21 requirements and established that these units are certified as Non-islanding for those sections of Rule 21 calling out such certification.

Participants in the Verification Subcommittee were:

Bill Cook, SDG&E

Ed Grebel, SCE

Jim Skeen, SMUD

Scott Tomashefsky, CEC

Mohammed Vaziri, PG&E

Chuck Whitaker, Endecon

from a natural gas engine. Emissions as low as 5 ppm NOx, 70 ppm CO, and 30 ppm NMHC (@15%O2) can be achieved.

Test Results^{iv}

Mark the box next to each requirement that has been met and each test that has been performed and successfully passed. Provide an explanation of any exceptions or omissions on a separate sheet. List additional test documents used on a separate sheet.

UL 1741: (Section number listed)

☒-39 N/A*-40.1 N/A*-41.2 ☒-44 ☒-45.2.2 ☒-45.4 N/A* .45.5
☒-46.2 ☒-46.2.3 ☒-46.4 ☒-47.3 N/A* -47.7 *Optional:* ☒-46.3

☒-IEEE/ANSI C62.45/C62.41 (location Category B3)

California Rule 21: ☐-J.3.e Non-export N/A+ J.3.f In-Rush Current N/A* J.3.h Synchronization

⁺ Uses natural gas engine to bring to speed, * Induction Machine,

Device Rating:^v 208/230/460 V, 3 phase, 60 Hz 1) 75 kW 245/224/112 A 2) 60 kW 200/181/99A

Maximum available fault current, A 1) CM-75 1600/1448/724A 2) CM-60 1327A/1185A/593A

In-rush current^{vi}, A Not applicable, uses natural gas engine to bring to speed

Trip settings^{vii}:

208 VAC System Tested

Protective Function	Test Voltage / Frequency	Measured Clearing Time	Factory Setting (CA Only)	Adjustable Range
Fast Under Voltage	59 Vrms ¹ (102.3 Volts)	0.03 seconds	104 Volts 0.16 Seconds	93-203 Volts 0.033-0.50 Seconds
Slow Under Voltage	105 Vrms ¹ (182 Volts)	2 seconds	182 Volts 2 Seconds	178-198 Volts 0.5-3.0 Seconds
Slow Over Voltage	133 Vrms ¹ (230.5 Volts)	0.440 seconds	229 Volts 0.5 Seconds	218-248 Volts 0.5-3.0 Seconds
Fast Over Voltage	166 Vrms ¹ (287.7 Volts)	0.100 seconds	286 Volts 0.10 Seconds	213-294 Volts 0.033-0.50 Seconds
Under Frequency	59.2 Hz	0.113 seconds	59.3 Hz 0.16 Seconds	57.0-59.5 Hz 0.033-0.50 Seconds
Over Frequency	60.6 Hz	0.133 seconds	60.5 Hz 0.16 Seconds	60.5 – 63.0 Hz 0.033-0.50 Seconds

¹ Adjusted to 120VAC nominal

Nominal Power Factor (Range, if adjustable) 0.9 and above with “add-on” capacitors

Non Islanding: Yes ☐ No ☒ Maximum trip time: _____

Non Export: Yes ☐ No ☒ Method: _____

Other^{viii}: _____

NOTES

- i Accreditation must apply to test standards listed herein
- ii Note here the date of certification, applicable serial number (range or first in series), or other information that indicates which units the certification applies to.
- iii List appropriate functions, capabilities, applications, limitations, etc. Use additional sheets as necessary.
- iv List all test documents (i.e. UL 1741, IEEE C62.45)and specific procedures (i.e. .UL 1741 Sec 39.1 – 39.5, etc.) used to evaluate device's suitability for utility interconnection
- v kW, kVA, V, A, etc as appropriate
- vi For devices that use grid power to motor to speed
- vii Trip value (Voltage in volts or frequency in Hz) and timing (in cycles). Devices with adjustable settings shall provide test results over the range of settings. For each test setting provide the setting values in the upper box and measured results in the lower box . List device ranges, if adjustable.
- viii Provide any additional information that may be useful in evaluating these results such as test configurations, device settings used to meet requirements, etc. Use additional sheets if necessary